

REMARKS

In the Final Office Action mailed on October 11, 2006, claims 17, 21, 51-57 have been rejected as obvious over U.S. Patent No. 5,904,740 to Davis ("Davis") in view of U.S. Patent Publication No. 2003/0170508 to Beckmann et al. ("Beckmann"). Claims 18 and 19 have been rejected as obvious over Davis in view of Beckmann and further in view of J. Power Source 112 (2002) 655-659 by Ha, Masel, and others ("the Ha reference"). Claim 22 has been rejected as obvious over Davis in view of Beckmann and further in view of U.S. Patent No. 6,924,055 to Hirsch et al. ("Hirsch"). Claim 23 has been rejected as obvious over Davis in view of Beckmann and further in view of U.S. Patent No. 5,898,113 to Vecere ("Vecere"). These rejections are traversed for at least the reasons set forth below. Timely reconsideration is respectfully requested.

A. RESTRICTION

The Final Office Action also includes a restriction of claims 58-63, and argues that these claims are a distinct species from other pending claims. This restriction is traversed. Each of claims 58-63 include the same structural elements of other pending claims, including, for example, an organic fuel cell containing a fuel solution that is at least 1.8 molar formic acid and having a plurality of passages for removing gas.

A previous restriction was issued in this matter on January 24, 2006. That restriction identified three inventions, including that classified as Group I directed to an organic fuel cell classified in class 429, subclass 12. This Group I was further restricted based on species, including that identified as Species I-2 directed to a direct organic fuel cell comprising an anode enclosure containing an organic fuel solution that is at least 1.8 molar formic acid. Other Species were identified as follows: Species I-1 (direct organic fuel cell having power density limitations), Species I-3 (organic fuel cell having gas remover), and Species I-4 (direct organic fuel cell having carbon cloth).

New claims 58-63, like the claims in Species I-2, include an anode enclosure containing an organic fuel solution of at least about 1.8 molar formic acid.

New claims 58-63 are therefore closely related to Species I-2. Further, claims 58-63 do not include any elements identified as belonging to others of the Species from the January 24, 2006 Election. Any search of the previously elected Species I-2 will therefore necessarily overlap with the search of claims 58-63. It is also believed that in fact no new search is required for these claims since they do not include any elements not already present in other pending claims and are likewise directed to organic fuel cells having a fuel solution of at least 1.8 molar formic acid and a plurality of passages for removing gas.

The Final Office Action includes a “constructive election,” and has withdrawn claims 58-63 from consideration. This withdrawal is respectfully requested to be reconsidered in light of the above comments.

B. CLAIM 17 AND ITS DEPENDENT CLAIMS ARE NOT OBVIOUS

Attention is now turned to the rejection of the claims, beginning with claim 17. Claim 17 is not obvious for at least the reasons discussed below. Since claim 17 is not obvious, claims 18-19, 21-23, and 51-57, all of which depend from claim 17, are likewise not obvious for at least the same reasons.

1. BECKMANN FAILS TO SUGGEST THE LIMITATIONS OF CLAIM 17

Claim 17 recites a gas remover comprising a plurality of passages that are configured to allow passage of CO₂ and that are positioned to promote circulation of the organic fuel solution as gas travels therethrough. The Final Office Action cites Beckmann as suggesting this recited element. The Final Office Action admits that Beckmann fails to disclose the claimed plurality of passages but suggests that the claim represents a mere duplication of parts disclosed by Beckmann and is therefore obvious. It is submitted that this is incorrect.

As explained in detail in Amendment A, Beckmann discloses only a single opening 72 for removing CO₂, and fails to disclose or suggest that this opening be positioned to promote circulation of fuel solution. As discussed in the specification, the

plurality of passages positioned as claimed has been discovered to offer benefits and advantages over the prior art in that they cause gas to flow through the fuel solution in a manner sufficient to provide useful circulation of the solution. Page 16, lines 15-19. This represents a new and unexpected result that is not disclosed or suggested by Beckmann.

Additional evidence of non-obviousness over Beckmann includes the improvements and benefits the claimed structure achieves over Beckmann's disclosure. As explained in the specification, the claimed gas remover structure at least partially contributes to the ability of the claimed cell to operate with high efficiency as a passive cell that does not rely on an external pump or other device for feeding fuel or circulating fuel solution. Specification, page 17, lines 29-31. Beckmann's active cell, on the other hand, relies on an external pump 11 for feeding fuel solution. Paragraph 34. Accordingly, the claimed structure at least partially contributes to benefits and advantages that are achieved over Beckmann's disclosure.

Claim 17 is therefore not obvious, and the rejection over Davis in view of Beckmann should be withdrawn.

2. THE EXAMINER IMPROPERLY ALTERS BECKMANN AND DAVIS BY CONCLUDING, CONTRARY TO THEIR TEACHINGS, THAT AN INOPERABLE STATE OF THEIR ACTIVE FUEL CELLS RENDERS THEM PASSIVE FUEL CELLS

Claim 17 recites a passive fuel cell. In rejecting claim 17, the Office Action argues that the active fuel cells of Davis or Beckmann can be "characterized as passive when the circulation of fuel reactants is interrupted or terminated." This is pure supposition of the Examiner, and not based on any teaching found in Davis or Beckmann.

With regard to Beckmann, the Examiner presumably assumes that its external pump 11 is broken to "interrupt or terminate" the fuel supply. However, Beckmann contemplates that the pump 11 is necessary to the operation of the active fuel it discloses. Likewise, Davis teaches that fuel solution is actively circulated into and out

of chamber 22 during operation. Fig. 1; col. 4, lines 36-46. When the circulation of fuel is “interrupted or terminated” as the Office Action suggests is necessary in its modification of Beckmann and Davis, their devices are inoperable.

Making an active fuel cell inoperable does not convert it to a passive fuel cell. The art and ordinary artisans recognize two types of fuel cells. One requires continuous feed of fuel solution using pumps or the like – active fuel cells such as Beckmann’s and Davis’. The teaching of a fuel supply that is “interrupted or terminated” is nowhere found in Davis or Beckmann. This is another reason that the rejection of claim 17 is improper and should be withdrawn.

C. THE HA REFERENCE IS NOT PRIOR ART TO CLAIM 19

Claim 19 depends from claim 17 and is allowable for the same reasons as are that claim. Claim 19 is allowable for other reasons as well. Claim 19 recites a fuel solution having a formic acid concentration of at least about 8.8 molar. Claim 19 stands rejected as obvious over Davis and Beckmann in view of the Ha reference. The Final Office Action admits that Davis does not disclose a fuel solution near this concentration and relies on the Ha reference as disclosing this concentration.

The Ha reference was published in Volume 112 of the Journal of Power Sources at pages 655 – 659. As shown on the attached Exhibit A, this issue of the Journal of Power Sources was published in November 2002, less than one year before the filing of the present application on September 17, 2003. The Ha reference names authors including Su Ha and Richard Masel. Mr. Masel and Ms. Ha are inventors of the present application. It is submitted that the portion of the Ha reference that discloses formic acid fuel cell solutions having a concentration of 8.8 molar or more originated from the current inventors. Accordingly, the Ha reference is not a prior art for this portion of claim 19, and the obviousness rejection based on it should be withdrawn.

D. CLAIMS 52 AND 53 ARE ALLOWABLE

Claims 52 and 53 depend from claim 17 and are allowable for the same reasons as are that claim. Claims 52 and 53 are allowable for other reasons as well. For example, claim 52 recites that each of the plurality of passages have an entrance extending inward into the anode enclosure that is separated from the at least one anode enclosure wall. Claim 53 depends from claim 52 and further recites that the entrance be separated from the wall by at least about 0.01 inch. As explained in the Specification, this claimed structure provides a new and unexpected result: "...it has been discovered that providing a passage entrance 44 that is separated by a distance from the wall 46 of the anode enclosure 30 is also useful to promote useful circulation of the fuel solution." page 17, lines 19-21.

Claim 52 stands rejected as obvious over Davis in view of Beckmann. Not only does Beckmann fail to disclose the recited plurality of passages that are positioned to promote circulation in the anode enclosure, but Beckmann further fails to disclose an entrance that is separated inwardly from the anode enclosure wall by some distance. It is noted that the Office Action has not provided any specific discussion of its rejection of claim 52 over Beckmann, but with regard to claim 53 the Office Action suggests that this claim represents a mere variation in dimensions or location over Beckmann. It is submitted that this is an oversimplification.

The Final Office Action alleges in its rejection of claim 17 discussed above that a plurality of passages would be obvious when considering the disclosure of Beckmann. Putting aside the applicant's disagreement with that rejection for the moment, it is submitted that the further extension of this argument to reject claims 52-53 cannot stand. For the rejections of these claims to be proper, it must be accepted that one considering Beckmann's single opening 72 will be led not only to duplicate this passage into a plurality of passages (and to position those passages to promote circulation of the fuel solution), but further that one would be led to the claimed structure of claim 52 that recites an entrance to each of the plurality of passages that is separated inwardly from an enclosure wall (and that the separation distance is at least about 0.01 inches to reject

claim 53). It is submitted that Beckmann's limited disclosure cannot be stretched this far, and that the obviousness rejection of claims 52 and 53 cannot stand.

It is also submitted that Beckmann's opening 72, as best understood, is disclosed as having an entrance that is flush with the interior wall of the anode enclosure 66. Beckmann therefore teaches away from claim 52.

Finally, it is submitted that if the limitations of claims 52 and 53 were truly obvious, some reference could be cited disclosing their limitations. It is noteworthy that the Final Office Action has failed to cite any reference that discloses even a single gas removal passage (much less the recited plurality of passages) having a passage entrance separated from an enclosure wall to extend inward into the enclosure.

E. CLAIM 57 IS ALLOWABLE

Claim 57 depends from claim 17 and is allowable for the same reasons as are that claim. Claim 57 is also allowable on other bases as well. For example, claim 57 recites that the anode enclosure be defined by a plurality of walls and that at least a first of the plurality of gas remover passages be in a first wall and a second be in a second wall. Claim 57 stands rejected as obvious over Davis in view of Beckmann.

As discussed above, although Beckmann fails to disclose the recited plurality of passages, the Office Action alleges that this would be obvious when considering Beckmann. Putting aside the applicant's disagreement with that argument, it is submitted that the further extension of Beckman's limited teachings to support an obviousness rejection of claim 57 is improper. As with claims 52-53 above, the inventive leap required from Beckmann's single opening 72 to the claimed structure is simply too substantial to be reached through an obviousness rejection.

When rejecting claim 57 as obvious over Beckmann, the Final Office Action suggests that it would have been an obvious matter of design choice to alter the passages of Beckmann into specific dimensions, length to diameter ratios and locations. In making this rejection, however, the Office Action overlooks Beckmann's failure to disclose a plurality of passages. For the rejection to be proper requires Beckmann's

single opening 72 not only suggest that one duplicate Beckmann's single opening 72, but further that Beckmann suggest that at least one of the duplicates should be located on a different enclosure wall than the opening 72. It is submitted that this represents an improper stretching of Beckmann.

As with the rejection of claims 52-53 noted above, it is also submitted that if these recited features were truly obvious, some reference would have been cited disclosing them. It is noteworthy that no reference has been cited disclosing a plurality of gas removal passages with at least one being located on a different enclosure wall than a second. For the above reasons, it is submitted that the obviousness rejection of claim 57 must be withdrawn.

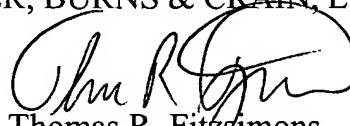
F. CONCLUSION

In conclusion, it is submitted that the obviousness rejections of claims 17-19, 21-23 and 51-57 are improper and must be withdrawn. Should the Examiner feel that there are any issues that may be resolved over the phone or issues that should be explored prior to an appeal, Applicant's undersigned attorney requests the favor of a phone conference to discuss the same.

Respectfully submitted,

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